Claims

1. Method for testing the error ratio of a device under test against a specified allowable error ratio with the following steps:

- measuring ns samples of the output of the device, thereby detecting ne erroneous samples of these ns samples,
- defining BER(ne)=ne/ns as the preliminary error ratio and
- deciding to pass the device, if the preliminary error ratio BER(ne) is smaller than an early pass limit EPL(ne),

characterized in that

the early pass limit is constructed by using an empirically or analytically derived distribution for a specific number of devices each having exactly the specified allowable error ratio by separating a specific portion DD of the best devices from the distribution for a specific number of erroneous samples ne and proceeding further with the remaining part of the distribution for an incremented number of erroneous samples.

2. Method for testing the error ratio according to claim 1,

characterized in that

the first point of the early pass limit is constructed by using an empirically derived distribution with the following steps:

- simulating the error behaviour of a high number of devices each having the specified allowable error ratio,
- noting in a first column of a table the number n_1 of samples until the first error occurs for each individual device,
- calculating the preliminary error ratio BER (ne=1) of the first error by $BER(ne=1) = 1/n_1$
- separating the best DD devices and identifying a separation point, which marks the preliminary error ratio

BER(ne=1) of the worst of the DD best devices, as the first point EPL(ne=1) of the early pass limit.

3. Method for testing the error ratio according to claim 2,
characterized in that
the next point of the early pass limit is constructed by the following steps:
- simulating the error behaviour of the remaining devices,
- noting in the next column of the table the number n_i of samples until the next error occurs for each individual device,
-calculating the preliminary error ratio BER(ne) of the next error by $BER(ne) = ne/\sum_i n_i$,
- separating the best DD devices and identifying a separation point, which marks the preliminary error ratio BER(ne) of the worst of the DD best devices, as the next point EPL(ne) of the early pass limit and
- repeating the above steps.

4. Method for testing the error ratio according to claim 2 or 3,
characterized in that
the simulating the error behaviour is done with a random generator or a pseudo random generator.

5. Method for testing the error ratio according to claim 1,
characterized in that
the first point of the early pass limit is constructed by using an analytically derived distribution with the following steps:
- defining a first preliminary distribution

$$P_1(ns) = BER \cdot (1-BER)^{ns-1}$$

with
BER is the true error ratio of the device and
P_1 is the probability to find the first error ne = 1 after ns samples,

- separating the DD best part from the 1-DD worst part of the distribution P_1 and identifying the separation point of the DD best part from the 1-DD worst part as the first point EPL(ne=1) of the early pass limit and
- defining the 1-DD worst part of the first preliminary distribution P_1 as a first distribution U_1 of undecided devices.

6. Method for testing the error ratio according to claim 5,
characterized in that
the next point of the early pass limit is constructed by the following steps:
- defining a next preliminary distribution

  $T_2(ns) = U_1(ns) * P_1(ns)$

  with

  $T_2(ns)$ is the probability to find the next error after ns samples regarding the loss of the best DUTs from the previous step and

  * is the convolution operation
- separating the DD best part from the 1-DD worst part of the distribution T_2 and identifying the separation point of the DD best part from the 1-DD worst part as the next point EPL (ne) of the early pass limit,
- defining the 1-DD worst part of the distribution T_2 as the next distribution U_2 of undecided devices and
- repeating the above steps.

7. Method for testing the error ratio according to any of claims 1 to 6,
characterized in that
the specific portion DD of the best devices is selected with regard of the desired selectivity of the test.

8. Method for testing the error ratio according to claim 7,
characterized in that
the selectivity of the test is defined as

(pass probability - (the complement of the pass probability, which is the fail probability)) /
(error ratio of a bad device - specified allowable error ratio).